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CLAIMS:

What is claimed is:

- 1 1. A robot, the robot comprising:
 2 a barcode scanner with a scan path, wherein the
 3 barcode scanner is affixed to the robot;
 4 an attenuation surface affixed to the barcode
 5 scanner, wherein the attenuation surface is located such
 6 that at least one end of the scan path of the barcode
 7 scanner is controlled by the attenuation surface;
 8 a positional encoding device for determining the
 9 location of the attenuation surface with respect to a
 10 target associated with at least one storage cell.
- 1 2. The robot as recited in claim 1, wherein the
 2 attenuation surface comprises a plurality of edges and
 3 wherein at least one of the edges are beveled.
- 1 3. The robot as recited in claim 1, wherein the
 2 attenuation surface is constructed from a material that
 3 is formable into sharp edges.
- 1 4. The robot as recited in claim 1, wherein the
 2 attenuation surface reflects light from a scanner
 3 illumination source in a non-detrimental manner.
- 1 5. The robot as recited in claim 1, wherein the
 2 attenuation surface controls one or more ends of the scan
 3 path during movement of the robot parallel to the scan

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4 path in order to determine a target position in a first
5 coordinate frame.

1 6. The robot as recited in claim 1, wherein the
2 movement of the barcode scanner substantially orthogonal
3 to the scan path will determine the target position
4 relative to positional data from the robot in a second
5 coordinate frame.

1 7. The robot as recited in claim 1, wherein the target
2 is a barcode.

1 8. The robot as recited in claim 1, wherein the
2 attenuation surface comprises a metal.

1 9. The robot as recited in claim 1, wherein the
2 attenuation surface is black anodized.

1 10. The robot as recited in claim 1, wherein the barcode
2 scanner is a laser scanner.

1 11. The robot as recited in claim 10, wherein the laser
2 scanner comprises:
3 a laser; and
4 a moveable reflecting surface which reflects light
5 from the laser to an object external to the laser
6 scanner.

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1 12. A robot, the robot comprising:

2 a barcode scanner with a scan path, wherein the
3 barcode scanner is affixed to the robot;

4 a positional encoding device for determining the
5 location of the scan path with respect to a target
6 associated with at least one storage cells within a
7 storage library.

1 13. The robot as recited in claim 12, wherein the

2 movement of the barcode scanner substantially orthogonal
3 to the scan path determines the position relative to
4 positional data from the robot.

1 14. The robot as recited in claim 12, wherein the target
2 is a barcode.

1 15. A positional determination device, the device
2 comprising:

3 a barcode scanner with a scan path affixed to a
4 moveable object;

5 an attenuation surface affixed to the barcode
6 scanner, wherein the attenuation surface is located such
7 that at least one end of the scan path is controlled by
8 the attenuation surface; and

9 a positional encoding device for determining the
10 location of the object with respect to an external
11 object.

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1 16. A library storage system, the system comprising:
2 a plurality of storage cells, wherein at least some
3 of the plurality of storage cells include a target;
4 a robot for moving items to and from the storage
5 cells, wherein the robot includes a barcode scanner with
6 a scan path, an attenuation surface, wherein the
7 attenuation surface is located such that at least one end
8 of the scan path is controlled by the attenuation
9 surface, and a positional encoding device for determining
10 the location of the attenuation surface with respect to
11 the target.

1 17. The library storage system as recited in claim 16,
2 wherein at least one of the edges of the attenuation
3 surface is beveled.

1 18. The library storage system as recited in claim 16,
2 wherein the attenuation surface is constructed from a
3 material that is formable into sharp edges.

1 19. The library storage system as recited in claim 16,
2 wherein the attenuation surface is configured to reflect
3 a scanner illumination source in a non-detrimental
4 manner.

1 20. The library storage system as recited in claim 16,
2 wherein the attenuation surface controls at least one end
3 of the scan path during movement of the robot parallel to
4 the scan path to determine target position in a first
5 coordinate frame.

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1 21. The library storage system as recited in claim 16,
2 wherein the movement of the barcode scanner substantially
3 orthogonal to the scan path determines the target
4 position relative to positional data from the robot in a
5 second coordinate frame.

1 22. The library storage system as recited in claim 16,
2 wherein the target is a barcode.

1 23. A method for determining the position of a robot
2 relative to a target, the method comprising:
3 translating a robot having a barcode scan engine
4 with a scan path having a scan path width controlled by
5 an attenuation surface in a direction substantially
6 parallel to the scan path;
7 determining a first parallel position at which the
8 target is first readable by the barcode scan engine; and
9 determining a second parallel position at which the
10 target is first becomes unreadable by the barcode scan
11 engine.

1 24. The method as recited in claim 23, further
2 comprising:
3 determining the center of the target in the parallel
4 direction from the first and second parallel positions.

1 25. The method as recited in claim 24, wherein the step
2 of determining the center of the target in the parallel
3 direction comprises assigning a position halfway between

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4 the first and second parallel positions as the center
5 position of the target in the parallel direction.

1 26. The method as recited in claim 23, further
2 comprising:

3 translating the robot in a direction substantially
4 perpendicular the scan path;

5 determining a first perpendicular position at which
6 the target first becomes readable to the barcode scanner;
7 and

8 determining a second perpendicular position at which
9 the target first becomes unreadable by the barcode
10 scanner.

1 27. The method as recited in claim 26, further
2 comprising:

3 determining the center of the target in the
4 perpendicular direction from the first and second
5 perpendicular positions.

1 28. The method as recited in claim 27, wherein the step
2 of determining the center of the target in the
3 perpendicular direction comprises assigning the midpoint
4 between the first and second perpendicular positions as
5 the center of the target in the perpendicular direction.

1 29. A system for determining the position of a robot
2 relative to a target, the system comprising:
3 first means for translating a robot having a barcode
4 scan engine with a scan path having a scan path width

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5 controlled by an attenuation surface in a direction
6 substantially parallel to the scan path;
7 second means for determining a first parallel
8 position at which the target is first readable by the
9 barcode scan engine; and
10 third means for determining a second parallel
11 position at which the target is first becomes unreadable
12 by the barcode scan engine.

1 30. The system as recited in claim 29, further
2 comprising:

3 fourth means for determining the center of the
4 target in the parallel direction from the first and
5 second parallel positions.

1 31. The system as recited in claim 30, wherein the
2 fourth means comprises assigning a position halfway
3 between the first and second parallel positions as the
4 center position of the target in the parallel direction.

1 32. The system as recited in claim 29, further
2 comprising:

3 fourth means for translating the robot in a
4 direction substantially perpendicular the scan path;

5 fifth means for determining a first perpendicular
6 position at which the target first becomes readable to
7 the barcode scanner; and

8 sixth means for determining a second perpendicular
9 position at which the target first becomes unreadable by
10 the barcode scanner.

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1 33. The system as recited in claim 32, further
2 comprising:
3 seventh means for determining the center of the
4 target in the perpendicular direction from the first and
5 second perpendicular positions.

1 34. The system as recited in claim 33, wherein the
2 seventh means comprises assigning the midpoint between
3 the first and second perpendicular positions as the
4 center of the target in the perpendicular direction.

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